THE ENGLISH SPARROW HAS ARRIVED IN DEATH VALLEY: AN EXPERIMENT IN NATURE[1]

THE English sparrow first became well established in the United States in 1860–1864 in the vicinity of New York City. Several small plants had been made in other Atlantic cities within the few years preceding, but practically all of these are definitely known to have failed. The original stock is in nearly all the cases of importation known to have been obtained in England. Its spread through the eastern United States after once established was phenomenal; its rate of invasion towards the west only slowed up at about the 100th meridian, and this, significantly enough, is about at the line limiting a great many species of native eastern birds toward the west and of native western birds toward the east. Nevertheless, the English sparrow ultimately crossed this barrier, constituted by change in humidity, and it has continued expanding its range until it exists now in nearly every part of every state in the Union. It has also extended throughout southern Canada and has become well settled in the Hawaiian Islands.

In California the English sparrow was first noticed in 1871 or 1872, in San Francisco, and it quickly thereafter appeared in many of the towns in the west-central part of the state. But it was very slow to enter southern California. It did not reach Los Angeles for nearly thirty-five years, in 1907; and San Diego was not reached until 1913. To-day it is familiar in practically every town "south of Tehachapi." Among the places in California now inhabited by the English sparrow, to designate some of those showing extremes of climate as regards temperature and humidity, are Brawley, Imperial County, and Sisson, Siskiyou County; Needles, San Bernardino County, and Eureka, Humboldt County.

In 1917 the California Museum of Vertebrate Zoology undertook as field work for that year a study of the vertebrate animal life of the Inyo region of southeastern California. In connection with this work it was the writer's not unpleasant fortune to spend the month of April in Death Valley. What was his sur-

[1] Contribution from the Museum of Vertebrate Zoology of the University of California.

prise to find there a thriving colony of English sparrows. These were established on the Greenland Ranch (otherwise known as Furnace Creek Ranch), elevation 178 feet *below* sea level. Specimens were collected, both as alcoholics and as dry study skins, but not to an extent to threaten the persistence of the colony. For here, it occurred to the writer, we had at hand a particularly convincing "experiment" already under way, of just the sort called for by certain critics of the work of the systematist and distributionist, which in time would test the question of the evanescence versus the relative permanence of characters of the category commonly viewed as subspecific.

The sparrows of Furnace Creek Ranch, which were estimated to number about fifty, had their main headquarters in the tops of the several tall Washington Palms which overshadow the ranch house; also several nests were seen in the Fremont cottonwoods which line the irrigation ditches along the alfalfa fields for a quarter of a mile down toward the glistening borax flats. The traveller on entering Death Valley is impressed by Greenland Ranch as a wonderfully rich oasis surrounded by a desert of surpassing barrenness. The English sparrow colony there is, then, isolated under a climate that is probably of the greatest extreme in the direction of high temperature combined with low relative humidity, of any place in North America.

Greenland Ranch is owned by the Pacific Coast Borax Company, who value it for its output of alfalfa hay and for certain appurtenant water rights, there being a constant flow of forty inches from the warm springs nearby. Fortunately for our present problem, the company has for years required its managers to keep a daily record of weather conditions. There is a standard instrument shelter, and the records are kept in available form, and furthermore have been transmitted regularly to the United States Weather Bureau. Without going into details here, it is of interest to note that the highest recorded temperature for any place in the United States was observed there on July 10, 1913, when an afternoon temperature of 134° Fahrenheit in the shade was reached.

As to the time of appearance of the sparrows in Death Valley I have good reason to rely on the statements of Mr. Oscar Denton, who is the present manager of the Greenland Ranch. He says that he first saw them in the ranch yard five years ago (1914). That was about the time the Death Valley spur of the Tonopah and Tidewater Railroad was run to the present location

of Ryan. Ryan, by the way, is the terminus of the narrow-gauge line, wherever that terminus happens to be, and this shifts about as determined by the extent of the different ledges of borax ore mined. The borax deposits on the floor of Death Valley are no longer gathered. The day of the 20-mule-team borax wagons is gone except on the labels. It is cheaper to handle the richer borax ore high on the mountain sides and to reach these ledges by railroad. The present Ryan, the nearest the railroad has so far gotten to Death Valley, is 17 miles from Greenland Ranch and 3,000 feet altitudinally above it. I saw English sparrows there repeatedly in April and May, 1917, as also at Death Valley Junction, 40 miles farther away, on the Tonopah and Tidewater Railway. Mr. Denton believes, and I think he is likely right, that the sparrows followed the construction camps along the route of the T. & T. R. R. from Ludlow to Death Valley Junction and thence along the narrow-gauge to Ryan. It may be further suggested that since hauling is done from time to time down the 17 miles of Furnace Creek Wash from Ryan to Greenland Ranch this is the route probably travelled by those sparrows which reached Death Valley. It is less probable to my mind that the birds simply started out overland, from some more distant point, and a pair or more just happened to reach this remote and forbidding valley. It is true, however, that the green of the ranch shines out conspicuously for miles round about and would surely attract to it any vagrant sparrow coming within sight.

We here in America have been accustomed to think of the English sparrow as a full *species, Passer domesticus.* The bird was originally named by Linnaeus, and thus has seemed from all standpoints to constitute a truly "Linnaean species." However, recent developments in the geographic knowledge of birds in the Old World has brought out the fact of geographic variation within the species *Passer domesticus* as previously understood, and also that a number of forms once considered specifically distinct are really connected with the *domesticus* stock through ordinary geographic intergradation. Hartert (1910, pp. 147–151) after a study of the group came to recognize no less than eight subspecies occupying different areas in Europe, western Asia and northern Africa. Subsequently, at least two more races have been named. And now, a German, Kleinschmidt, has discovered that the sparrows of England are distinguishable from those on the continent. The latter, having been

the basis of Linnaeus's name, becomes *Passer domesticus domesticus,* and the sparrow of England Kleinschmidt names (cited under date 1915, though I have not seen the original description myself) *Passer domesticus hostilis.* As pointed out by Oberholser (1917, p. 329), since the American stock came from England our bird must also be known under this name. And furthermore, the vernacular term, European house sparrow, which some people have preferred because of a fancied unpleasant association in the name English sparrow, can not be used properly for the American bird.

The point I wish to make now is that the English sparrow, which is spread all over the United States, is itself a subspecies of a wide ranging and decidedly variable species which is thus, geographically speaking, quite like our American song sparrow, or the horned lark. In the Old World, each race "stays put" as regards aggregate of population, each in its own faunal area just as do our own song sparrows. All of these races are nonmigratory. *Passer domesticus hostilis* Kleinschmidt is also nonmigratory, as far as I have been able to learn, wherever it now occurs, north and south, in America. But here, by reason of its marvellous powers of accommodation, and finding no competitor in exactly its own ecologic niche, it has gradually advanced its frontiers and overleaped all the faunal boundaries which hem in the habitats of our native bird races; and we find flourishing representations of it under the most diverse conditions of environment, as for example those shown in contrast by Death Valley and Boston.

Possibly our critics have been merely baiting us when they asked us to transplant a desert song sparrow to the humid coast belt and "see what would happen." But is not this demand met exactly in the case of the English sparrow, only in reverse direction? I have carefully compared the seven skins taken in Death Valley with others taken in Berkeley, and also with examples taken in the eastern United States, without finding any peculiarities of color tone, extent of markings, or dimensions. And I think my eyes are pretty well trained to find small subspecific distinctions, at least of such magnitude as characterize the currently recognized subspecies of song sparrows, Savannah sparrows, and horned larks. The Death Valley birds, it is true, stand out rather sharply from most of the material taken elsewhere, but only in that they are fresh and clean, and lack the sooty overcast of the majority of town birds. To repeat, no dif-

ferences are now discernible from place to place in North America, in so far as perfectly comparable material is at hand. This accords with the findings of Phillips (1915), which also were practically negative.

Are we not to infer, then, that there has not as yet been sufficient time (up to three years and as many possible generations in Death Valley and up to sixty years elsewhere in North America) for the impress of diverse environments in the different parts of the territory newly occupied by *Passer domesticus hostilis* to bring physical changes in the birds of sufficient magnitude for the modern systematist to detect? Is there not here a demonstration of the relative permanence of subspecific characters far beyond what many naturalists have supposed? Are not such characters in general far more likely to be germinal than somatic?

How intensely interesting it will be to watch the course of this "experiment," now under way, irrespective of human effort, in Death Valley, with "controls" vigorously maintaining themselves (against man's wish!) in San Diego, Berkeley and Boston.

But perhaps it will be urged that the conditions of an orthodox experiment are not here properly met. The "factors" of the environment are not sorted out, and none is under any kind of regulation. Moreover, rigid control has not been secured, in that there is no way in which any of the naturally established colonies of English sparrows can be strictly isolated and kept from genetic contamination by new influxes of birds from elsewhere.

In reply, I would say that we are not expecting more from our natural experiment than the demonstration of what we set out to prove, namely, the length of time necessary for the development, in a stock under natural conditions some of which are known, of characters of subspecific value. In the breeding cage there are always "unknown" factors; so let us admit the existence of those in the wild as not invalidating the "experiment" as such. In nature, subspecies *have* differentiated under just the conditions self-imposed by the English sparrows through their powers of invasion. *Individual* song sparrows and horned larks are continually overstepping the bounds of the habitats of the races to which they belong and have doubtless done so since the initiation of their respective descent lines. But differentiation of the mass *has taken place, under just these conditions.*

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